

## AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

### Listing of Claims:

- 1           1.       (Currently amended) A method for enhancing reliability,  
2       availability and serviceability in a computer system by replacing a signal from a  
3       failed sensor with an estimated signal derived from correlations with other  
4       instrumentation signals in the computer system, comprising:  
5       determining whether a sensor has failed in the computer system, wherein  
6       an output signal from the sensor is applied to an input; and  
7       applying if the sensor has failed, using an estimated signal to the input in  
8       response to determining that the sensor has failed for the failed sensor in place of  
9       the actual signal from the failed sensor during subsequent operation of the  
10       computer system, whereby the computer system can continue operating without  
11       the failed sensor;  
12       wherein the estimated signal is derived from correlations with other  
13       instrumentation signals that include at least one of:  
14                 a signal associated with an internal performance parameter;  
15                 a signal associated with a physical performance parameter;  
16                 and  
17                 a signal associated with a canary performance parameter in  
18       the computer system.

- 1           2.       (Currently amended) The method of claim 1, wherein determining  
2       whether the sensor has failed involves:

3        ~~deriving an estimated signal for a sensor from correlations with other~~  
4        ~~instrumentation signals in the computer system; and~~  
5        comparing a the output signal from the sensor with the estimated signal to  
6        determine whether the sensor has failed.

1            3.        (Currently amended) The method of claim 2, wherein comparing  
2        the output signal from the sensor with the estimated signal involves using  
3        sequential detection methods to detect changes in the relationship between the  
4        output signal from the ~~failed~~ sensor and the estimated signal.

1            4.        (Original) The method of claim 3, wherein the sequential detection  
2        methods include the Sequential Probability Ratio Test (SPRT).

1            5.        (Original) The method of claim 1, wherein prior to determining  
2        whether the sensor has failed, the method further comprises determining  
3        correlations between instrumentation signals in the computer system, whereby the  
4        correlations can subsequently be used to generate estimated signals.

1            6.        (Original) The method of claim 5, wherein determining the  
2        correlations involves using a non-linear, non-parametric regression technique to  
3        determine the correlations.

1            7.        (Original) The method of claim 6, wherein the non-linear, non-  
2        parametric regression technique can include a multivariate state estimation  
3        technique.

1            8.        (Original) The method of claim 5, wherein determining the  
2        correlations can involve using a neural network to determine the correlations.

1           9.       (Canceled).

1           10.     (Original) The method of claim 1, wherein the failed sensor can be  
2 a sensor that has totally failed, or a sensor with degraded performance.

1           11.     (Currently amended) A computer-readable storage medium storing  
2 instructions that when executed by a computer cause the computer to perform a  
3 method for enhancing reliability, availability and serviceability in a computer  
4 system by replacing a signal from a failed sensor with an estimated signal derived  
5 from correlations with other instrumentation signals in the computer system, the  
6 method comprising:

7                 determining whether a sensor has failed in the computer system, wherein  
8 an output signal from the sensor is applied to an input; and

9                 applying if the sensor has failed, using an estimated signal to the input in  
10 response to determining that the sensor has failed~~for the failed sensor in place of~~  
11 ~~the actual signal from the failed sensor during subsequent operation of the~~  
12 ~~computer system~~, whereby the computer system can continue operating without  
13 the failed sensor;

14                 wherein the estimated signal is derived from correlations with other  
15 instrumentation signals that include at least one of:

16                         a signal associated with an internal performance parameter;

17                         a signal associated with a physical performance parameter;

18                         and

19                         a signal associated with a canary performance parameter in

20                         the computer system.

1           12.   (Currently amended) The computer-readable storage medium of  
2 claim 11, wherein determining whether the sensor has failed involves:  
3       ~~deriving an estimated signal for a sensor from correlations with other~~  
4 ~~instrumentation signals in the computer system; and~~  
5       comparing a the output signal from the sensor with the estimated signal to  
6 determine whether the sensor has failed.

1           13.   (Currently amended) The computer-readable storage medium of  
2 claim 12, wherein comparing the output signal from the sensor with the estimated  
3 signal involves using sequential detection methods to detect changes in the  
4 relationship between the output signal from the ~~failed~~ sensor and the estimated  
5 signal.

1           14.   (Original) The computer-readable storage medium of claim 13,  
2 wherein the sequential detection methods include the Sequential Probability Ratio  
3 Test (SPRT).

1           15.   (Original) The computer-readable storage medium of claim 11,  
2 wherein prior to determining whether the sensor has failed, the method further  
3 comprises determining correlations between instrumentation signals in the  
4 computer system, whereby the correlations can subsequently be used to generate  
5 estimated signals.

1           16.   (Original) The computer-readable storage medium of claim 15,  
2 wherein determining the correlations involves using a non-linear, non-parametric  
3 regression technique to determine the correlations.

1           17.     (Original) The computer-readable storage medium of claim 16,  
2 wherein the non-linear, non-parametric regression technique can include a  
3 multivariate state estimation technique.

1           18.     (Original) The computer-readable storage medium of claim 15,  
2 wherein determining the correlations can involve using a neural network to  
3 determine the correlations.

1           19.     (Canceled).

1           20.     (Original) The computer-readable storage medium of claim 11,  
2 wherein the failed sensor can be a sensor that has totally failed, or a sensor with  
3 degraded performance.

1           21.     (Currently amended) An apparatus that enhances reliability,  
2 availability and serviceability in a computer system by replacing a signal from a  
3 failed sensor with an estimated signal derived from other instrumentation signals  
4 correlations with in the computer system, comprising:  
5           a failure determination mechanism configured to determine whether a  
6 sensor has failed in the computer system, wherein an output signal from the sensor  
7 is applied to an input; and  
8           a sensor replacement mechanism, wherein if the sensor has failed, the  
9 sensor replacement mechanism is configured to apply, ~~use~~ an estimated signal to  
10 the input ~~for the failed sensor in place of the actual signal from the failed sensor~~  
11 ~~during subsequent operation of the computer system,~~ whereby the computer  
12 system can continue operating without the failed sensor;  
13           wherein the estimated signal is derived from correlations with other  
14 instrumentation signals that include at least one of:

15 | a signal associated with an internal performance parameter;  
16 | a signal associated with a physical performance parameter;  
17 | and  
18 | a signal associated with a canary performance parameter in  
19 | the computer system.

1 | 22. (Currently amended) The apparatus of claim 21, wherein the  
2 | failure determination mechanism is configured to:  
3 | ~~derive an estimated signal for a sensor from correlations with other~~  
4 | ~~instrumentation signals in the computer system; and to~~  
5 | compare a the output signal from the sensor with the estimated signal to  
6 | determine whether the sensor has failed.

1 | 23. (Currently amended) The apparatus of claim 22, wherein ~~while~~  
2 | ~~comparing the signal from the sensor with the estimated signal,~~ the failure  
3 | detection mechanism is configured to use sequential detection methods to detect  
4 | changes in the relationship between the output signal from the ~~failed~~ sensor and  
5 | the estimated signal.

1 | 24. (Original) The apparatus of claim 23, wherein the sequential  
2 | detection methods include the Sequential Probability Ratio Test (SPRT).

1 | 25. (Original) The apparatus of claim 21, further comprising a  
2 | correlation determination mechanism, which is configured to determine  
3 | correlations between instrumentation signals in the computer system, whereby the  
4 | correlations can subsequently be used to generate estimated signals.

1           26.     (Original) The apparatus of claim 25, wherein the correlation  
2     determination mechanism is configured to use a non-linear, non-parametric  
3     regression technique to determine the correlations.

1           27.     (Original) The apparatus of claim 26, wherein the non-linear, non-  
2     parametric regression technique can include a multivariate state estimation  
3     technique.

1           28.     (Original) The apparatus of claim 25, wherein the correlation  
2     determination mechanism is configured to use a neural network to determine the  
3     correlations.

1           29.     (Canceled).

1           30.     (Original) The apparatus of claim 21, wherein the failed sensor can  
2     be a sensor that has totally failed, or a sensor with degraded performance.